POPULAR MECHANICS

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TELLS YOU HOW TO DO THINGS. WRITTEN SO YOU CAN UNDERSTAND IT

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Women House Builders in Arizona

Women Have Built These Houses for 2000 Years

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HOPE HOUSE BUILDERS.

By George Wharton James.

Mr. James has a national reputation for his explorations among the Indian tribes of Arizona and New Mexico. He has spent more time in navigating the Grand Canyon of the Colorado than any other white man. He has written a series of short sketches expressly for Popular Mechanics.—Editor.

The Hopes are a singular people. They are living their ancient life of a thousand or two thousand years ago in the very heart of our modern civilization. Within a day of our telegraphs, telephones and railway engines they persist in their antique and strange methods.

We have among us a number of women who for years have been agitating for what they legitimately regard as their rights. The Hope women have possessed these rights for untold centuries. The women do not change their names when they marry; the children born of a marriage belong to the woman's clan or family and not to that of the man; the woman has the right of divorce as well as the man; the woman owns and builds the house, controls and directs it and all it contains; and to even up things the man wears the woman's garments and knits the household's stockings.

It is an interesting thing to witness a group of Hope women building a house. It is a rare sight, seldom seen by a white man. Hence I deemed myself fortunate that I was able to secure the accompanying photograph. It cost me twenty-six calico dresses, however, for I had to pledge my word (which they knew me well enough to accept) that if I was allowed to make the photograph I would send up a piece of calico for each woman at work. And I kept my promise. But there would be rare fun when the calico arrived, for I had various remnants of differing lengths, qualities and patterns and I sent the lot up for them to "fight it out" among themselves as to which belonged to which. I'm glad I wasn't there to decide for them.

The material used in building is mud and stone. The mud that gathers in the sandy water courses of the valleys below is found to contain a good deal of sticking quality, and the chips and small pieces of disintegrated rock of the mesas on which they dwell give them abundant rock. Without plumb line, square or level they go to work. Women are hod-carriers, mud mixers, rock layers and plasterers, and the men keep out of the way, being quite ready and willing, however, to help in lifting a heavy roof beam into place, or to do any similar service. In the doorway will be seen a woman with an old battered tin dish pan full of rocks, which she will speedily carry up the ladder. On the roof are the workers in mud and rock and it is remarkable how well they do the work, considering that they have no tools. The hand is the sole implement.

When the houses are finished they are generally three stories in height, the second story being behind the first, and the third behind the second, so that the street has the appearance of being a crude Jacob's ladder.

SPRINKLING DENVER STREETS WITH OIL.

The board of public works is sprinkling some of the Denver streets with oil instead of water. Crude oil mixed with residuum from the refineries is used. It is sprinkled with a sprinkling cart after having been heated with steam from one of the city steam rollers. Municipal Engineering says:

A coating of coarse sand one inch thick was then applied and in twenty minutes the street had assumed its former appearance, except for a dark grayish hue, and it was impossible to raise the dust. Another application of oil will be given in a few months, and it will also be applied to other streets. It is estimated that the streets can thus be sprinkled and cemented at a cost of 20 cents a front foot per annum, or about $25 a lot, which will make the cost for the entire city less than the amount now expended for water sprinkling.

MASURITE IS MORE POWERFUL THAN DYNAMITE.

New Explosive Which May Be Carried and Tossed About With Impunity is a Boon to Miners.

A flameless explosive, which is more powerful than dynamite and yet may be carried and thrown about like so much sand, has been invented by F. L. M. Masury of New York. It is called "masurite," from the name of its inventor. The new substance is now attracting wide attention in the scientific world. It will doubtless revolutionize the methods employed in blasting and other work in which dynamite is used, and will mark a new era in mining.

No more horrors of prematurely exploded charges hurling hundreds of toilers to death will fill the columns of our daily newspapers when "masurite" comes into general use. Thus while a great labor saving compound, "masurite" is also regarded as a boon to mankind and its inventor is hailed by miners far and near as a public benefactor.

"Masurite" is a light yellowish powder, granular and somewhat resembling fine sand in appearance. A company has been organized for its manufacture and has established offices at 50 Broadway, New York, and 417 Hayward building, San Francisco. The company is known as the Masurite Explosive company.

The remarkable compound was discovered by Mr. Masury while attempting to find a flameless explosive. He succeeded in this attempt and tests proved his compound to possess virtues far greater than he had supposed. Heat, cold or moisture have virtually no effect upon it. The Mining and Scientific Press says:

"The heat of the ordinary flame will fuse it, but in melting it loses its explosive properties. By itself it will not burn but slowly consumes when brought in contact with carbonaceous materials. It weighs about one-third less than an equal bulk of dynamite and costs about the same as 40 per cent dynamite."

The only way the "masurite" cartridges can be exploded is by being fitted with the fuses intended for them and set off in the manner described in the directions. In the tests the "masurite" was placed on an anvil and struck with a sledge without effect. Heavy iron weights were dropped on "masurite" cartridges; cans of the compound were perforated with shots fired from rifles; burning brands of charcoal were placed in the powder; red hot iron bars were run through the cartridges and stirred about in cans filled with the "masurite;" the powder was rubbed between sandpaper and a dozen other equally severe tests were made but in no way could the compound be exploded except when the fuse was lighted in the regular manner. Then the force of the detonation was by far more terrific than could have been made by an equal amount of dynamite.

Because of its being flameless masurite is absolutely safe in gaseous and dusty coal mines, which can be said of no other known explosive. Had the properties of this wonderful new compound been known sooner the great disasters in the coal mines of Tennessee, the horror at Johnstown, Pa., and many other deplorable accidents of recent occurrence might have been averted and hundreds of families now bereaved, destitute and miserable might yet have been living in contentment. Masurite in these instances would not have ignited the gas or dust in the mines and the terrible explosions would have been avoided.

A school for familiarizing horses with automobiles is to be started at Kenosha, Wis., by George Bennett, sales manager of the T. B. Jeffrey Co., which company has been forced to pay heavy damages several times as the result of horses taking fright at automobiles.

The work of tearing down old Newgate prison of London has begun. Grim and forbidding, the ancient structure, which has housed so many men and women doomed to death, has stood for 150 years, during which time there have been many false reports of its intended destruction.

Logging the Giant Redwoods

Here we have a picture of the famous "Admiral Dewey" redwood tree, which measured twenty-one feet in diameter at the butt end. The very thin sap portion of the redwood tree is shown where the log has been cut on the side. The sap of redwood timber is the only portion that is at all affected by the elements, and the logs that were felled in the woods fifty years ago, and left there, are today as sound as ever with the exception of the sap layer. In redwood this is so small a part of the whole log that it is practically nothing at all that is lost by leaving the logs lying in the woods. This country is covered with big logs left in the early fifties when lumbering began here, and it is now coming time when they are being picked up and sawed. With the exception of the narrow sap strip, nothing has been lost by leaving the log in the woods and lots has been gained by the increase in lumber values.

The great redwood trees of California are famous throughout the world. Towering hundreds of feet in the air, these giants of the forest have stood for centuries. To witness the fall of one of these monsters is a sight never to be forgotten. B. F. Cobb, editor of the Lumber Review, Chicago, when in California recently traveled many miles to visit a redwood logging camp, and one of the largest trees was felled for his special benefit. He describes the event as follows:

Imagine a country divided by ridges and crossed by deep gulches, and in a general way you will conceive properly the redwood country. The felling of the tree is often the ruination of it, for if it fall upon a rock or stump, the weight of the tree is sufficient to crush it, for it is seldom that a redwood stump is found that is not absolutely sound.

As a result of this condition there has been developed, by constant practice, a class of expert woodsmen who can gauge the falling of these giants with incredible precision. But it is difficult to rely upon always being able to keep the same crew of expert woodsmen, and it is this fact, together with the broader one, that it is unwise not to take advantage of a good thing when you find it, that has led to the adoption of a landing-gun, which is used in the logging of today. This gun, as it has been styled, is a simple apparatus, yet the work it does is very accurate. Built something after the style of the old-fashioned cross-gun, this thing is arranged with a pair of sights, as in the rifle, and this device is placed in the immense undercut which is made in felling the tree. By a simple method of sighting along the top of the stick, whch forms the barrel of this gun, the direction of the undercut is determined and as the cut, so falls the tree. In a field of stumps, and in a place where rocks are plentiful, the tree of 300 feet in length can be felled within a space of six inches from the spot desired. And when one sees the difficulties attendant upon the logging in this country, the fact seems the more incredible.

There has been nothing in all the experiences of my trip through this country, which caused more of a realization of the immensity of this timber and the real awfulness of its logging, than to see but more especially to hear the giant fall. Whenever it is possible to do so, the trees are felled down hill. Sometimes the conditions about the land are such as to make it unnecessarily hazardous to fell them down the gulch and in this case the direction selected by the "gunner" is either up the slope or sidewise on the hill. But great fascination attendant upon the felling is found in nearly all cases, for the tree usually goes down the ravine. With a warning cry from the gunner of "Down the hill," there is heard a groan which lends itself into an almost deafening roar. It seemingly is a minute of increasing thundering before the noise begins to die away in the lesser rumbling of the breaking branches. During the fall of this tree, it may have left its stump behind it to the extent of thirty feet, so much does the tree sometimes lurch in its descent.

Following closely upon the felling of the tree, come the choppers who strip off the branches and limbs, and then in order

come the "peelers." This is a set of woodsmen unknown to the logging of other districts. These men use a sort of prying iron, and with this implement they strip the trunk of the thick bark, running from six to sixteen inches thick. The bark is left as it is peeled from the trunk and after a week or two the men in the camp go on a burning trip. All these stripped trees are visited and the pile of bark around their trunks is fired.

The bark has dried sufficiently to insure its destruction by fire but the trunk of the tree has not yet become dry to any depth. So it is safe to apply the torch and the men go from tree to tree applying the fire until the whole tract of felled timber is on fire. In most instances, if the tree is sound, it is safe to give it no further attention, as the bark will burn for a few hours without injury to the trunk of the tree.

Not so with the defective redwood tree. Many of them have a defective heart, in fact all are somewhat defective here, and to such is the greatest attention given. The fired bark is watched and as it starts on the tree, to work its way into its center, a crew of men are on hand who have with them the device peculiar to these woods. It is a water-gun which they use to reach the innermost parts of the log. Occasionally in the woods is found a monster log that has burned out sufficiently for a man to walk through.

After the fires are all out, comes the getting of the logs from those inaccessible gulches, away back from the camp from one to two miles, down to the camp and then to the loading on the cars. Up where the tree is felled, or somewhere within a short distance, is a donkey engine called the "yarder." As soon as the tree is felled, burned, and cut into logs, the cable from this yard engine is fastened to each log separately. It is hauled to some near-by point where the logs are to be assembled, then the cable is taken back for the second log. In this way the logs from trees adjacent to this place are hauled to one common assembling station. Here they are all fastened together, in the form of a chain and the big cable from the big "bull-donkey" away down at the main landing is called upon. By means of an electric bell service the workmen back in the mountains give the signal that all is ready. The big engine at the landing gives a whistle of acceptance and the big cable starts on its long, hard pull.

Here is a place where much danger is, and so great is the caution taken that few accidents occur. The danger rests in the attempt to step over this slowly moving cable. It is running but a couple of feet from the ground and there is a temptation to step over instead of going around. Because of the immense weight being hauled, it will break the bones of the leg should it sway and strike a seemingly light blow. It takes an hour to haul a load of a dozen logs, which is the usual number from a point back in the woods a distance of two miles.

AUTOMOBILE AS COMMON CARRIER.

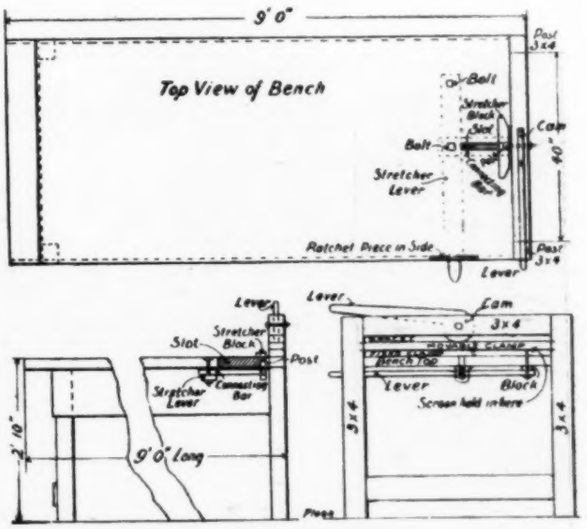
The trolley lines have given the steam roads pretty sharp competition and now the automobile looms up as a rival of both. The possibilities are surprising. Where good roads exist the autos can be operated at one-fourth the cost of railroads, without the big investment in tracks and the expense of keeping them in repair.

In the recent test from Paris to Vienna, the distance of 825 miles was covered in 15 hours and 22 minutes actual running time. The journey was made by daylight only, hence the trip was not continuous. At the same time the average speed when running was nearly 54 miles an hour and over mountains part of the way, where the roads were rough and poor. There were several in the race which made nearly as good time as the winner. It will not be so many years before we get good roads in this country and then the departure and arrival of the auto from thousands of towns and cities will be as regular and commonplace an event as the passenger trains on steam roads are now.

A SCREEN FRAME BENCH.

A writer in the Wood Worker describes a bench for stretching wire screen on doors and windows. The idea may be applied to the tail end of any ordinary carpenter's bench, made so that the parts and clamps can be removed after the screen season is past.

The wire cloth is passed between the faces of the clamping pieces, drawn over and tacked firmly to the opposite rail of the



SCREEN FRAME BENCH.

screen frame; that is, the one farthest away from the clamp. After tacking, draw the loose screen down evenly, by hand, pull down the cam lever, thus holding the screen tight. Next pull the stretcher lever away from the clamp, without using strength enough to tear the screen from the tacks; then finish tacking on the screen. You are now ready to put on the moldings, cut off the screen and repeat the operation.

The clamps will hold the wire more firmly if a piece of canvas or rubber is glued on the upper side of the fixed clamp. To further facilitate the work, make a rack of two upright posts with broad feet and a framed brace across top and bottom, looking like a mammoth towel rack, having five or six removable rounds on which to hang the different widths of wire cloth, thus having them convenient for immediate use.

GOOD THINGS TO KNOW.

Many persons make a mistake is using a hot instead of a warm iron to extract grease spots from a piece of cloth goods, says the National Laundry Journal. If scorched by such a process use a sponge on it soaked with ether. A warm iron applied to a grease spot will soften and bring the grease to the surface and then the application of a warm suds will remove the same from the garment.

To take rust out of linen use a paste of cream of tartar, common salt and sour buttermilk. Apply to spots and lay in the sun for some hours. Should the spot not yield entirely wash it and cover over a second time with the paste. Rust and iron mould are really one and the same thing.

A simple way to clean a straw hat is to cover it over with coarse corn meal, slightly dampened; rub in well; brush it off and cover with dry meal. Leave this on several hours, carefully brush out every grain of the meal and sponge quickly with peroxide of hydrogen.

The first English-built electric auto ever used for the delivery of mails in any country is being tested by the Postal authorities in the service between Mount Pleasant and Waterloo, Ia.

Laundries of the World

[Being a series of interesting views personally gathered by Mr. Charles Dowst, editor of the National Laundry Journal, while studying the Laundry systems of all nations. These views portray the curious and unique customs of many lands.]

THE WASHING BOATS—These unique contrivances are very common in various portions of Europe. Washing boats, or rather rude floats, with a roof over them, anchored in the rivers or canals can be seen in or near every town and it is there the principal part of the laundry work is done. Above, two of them may be seen in Lake Geneva with the washers at work. The boats are located close to the shore near the center of the famous old Swiss town of Geneva. The river Rhone, which is formed by the narrowing of the lake, rushes through the city, dividing it into two almost equal parts. The water is clear and as a result the laundries of Geneva are able to give their patrons clean work, though of course nothing to compare with that of a steam laundry.

DIVER TO REMAIN IN WATER FOR A MONTH.

Successful experiments were recently made on Lake Geneva, Switzerland, with a new apparatus for saving life at sea invented by Prof. Probst, a native of Geneva. The apparatus consists of a diving suit of India rubber opening in the center. It can be rapidly donned. It is so buoyant that nearly half the body remains above water. Air-tight pockets on the outside of the dress contain a lamp, matches, stores of food and a trumpet. Prof. Probst entered the water at 6 o'clock in the evening and remained there until 11 o'clock. Large crowds watched his entrance and departure from the water. The professor intends to pass the whole of August in the water and then will go to Havre, where he will remain fifteen days in the sea.

With a corpse at the throttle an engine on the Pere Marquette ran three and a half miles from Williamsburg to Bates, Mich., a few days ago. The engineer, who was named Pickett, was killed and Fireman Dwyer dangerously wounded while sitting in their cab by being struck by the Petosky flyer while the engine was entering a side track.

The allied labor unions of Manila under the leadership of Isabello de los Reyes, emulating the Americans, have demanded a raise of 50 per cent in their wages and threaten to strike if it is not granted.

MANUFACTURERS' CONVENTION AT NEW ORLEANS.

The next meeting of National Association of Manufacturers will be held at New Orleans in April. The selection was made at the urgent request of New Orleans manufacturers. The meeting will be at a time when the weather is most disagreeable of all the year in the north and when spring is in its most lovely mood in the south. It is a spring such as is unknown to the north and to add to the pleasure of the visitors will be the quaint and curious sights of the historical southern city and the bountiful distribution of real southern hospitality for which the Crescent City is famed. There the northern manufacturers will meet members of the association from all the southern cities and representative business men from Mexico, Central America, the West Indies and South America.

The first step toward the introduction in America of a government postal telegraph service, was taken in the bill of Senator Penrose authorizing the postmaster general to contract for the transmission of money orders by wire. It is said that the organization of an entirely new company for government telegraph business exclusively is back of the bill.

In Great Britain there are 935 municipalities owning and operating their own water works; 99 cities or towns that own their "tramways" or street car lines; 240 owning gas works, and 181 controlling their electric plants.

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MAKING STEEL BY ELECTRICITY.

Will the Melting of Metals Be Revolutionized?

By U. S. Consul R. S. Bergh.

A visitor from another world on approaching this would think America a land of active volcanoes if he chanced to approach in the vicinity of any of our great iron-working centers. The clouds of smoke and pillars of flame mounting high in the air have every appearance of some great convulsion of Nature. Engineers are already predicting this will all be changed and that the largest blast furnaces will produce no more smoke than comes from a kitchen fire. Electricity is the agent which will work the revolution. No longer will trainloads of coal hasten day and night in an endless procession across the land to feed the hungry mouths of thousands of furnaces. Instead, electricity generated at waterfalls large and small, natural and artificial, will be gathered and united in one great current to do the work.

Experiments were begun in January, 1900, at Gysinge, Sweden, and have been continued with increasing promise of success. A furnace with a capacity of producing 1,500 tons a year is now building, and the melting will be done with an electric current produced by a 300-horse-power turbine driving a generator. The quality of steel produced is the best.

Engineer Kjellin said that the steel produced is of superior quality and characterized by strength, density, uniformity, toughness, and the ease with which it can be worked in cold, unhardened condition, even when containing a very high percentage of carbon. Compared with other steel, it also has less tendency to crack or warp when hardened.

The reason why this steel in certain qualities differs from other steel, especially in its softness when unhardened, is considered to be its freedom from gases. The manufacture of special steel, with nickel, chrome, manganese, or wolfram, will, of course, not meet with any difficulties. The chrome steel and wolfram steel produced at Gysinge has proved to be excellent for lathe tools. When used for permanent magnets, the Gysinge wolfram steel has been found to give stronger magnets than other wolfram steel and has not warped in the hardening.

The American baggage check system is to be adopted in the German empire by order of Emperor William.

OIL WELL SPOUTS WITH VOLCANIC FURY.

Sand, Gas and Rocks Hurled Heavenward and Roaring Heard Eight Miles Away.

Oil workers came near tapping a miniature volcano in working on the Guffeys No. 2 at Sour Lake, Texas. The well got away from the drillers and spouted an immense column of sand, gas, oil and rocks high in the air. The rotary was raised six feet from the ground and prevented any attempt to control the well. The spouting began at 8:45 in the morning and by noon the entire derrick was destroyed. The roar caused by the escaping gas was heard eight miles away and telephone operators at Kountz, 20 miles distant, heard it distinctly over the wire. The ground trembled as if it were an incipient earthquake. When the work of devastation was over the next day the well looked like a small volcanic crater. A hole more than 30 feet square marked the place where the casing was built. The rotary, one pump and many feet of heavy pipe had disappeared forever into the yawning chasm. A heavy iron hook on the main block was worn away until nothing but a piece of steel weighing not more than one pound remained. The edges of the remnant were worn as sharp as a knife and the entire surface was corrugated by sand as if cut with a sharp knife. A heavy pine sill 8 by 12 was cut in two as if done by a saw.

MRS. PEARY SAILS IN QUEST OF HER HUSBAND.

Wife of the Famous Explorer Starts With Relief Expedition—Says She Will Not Return Without Her Husband.

[By Mrs. Robery E. Peary, wife of Lieut. Peary, the famous Arctic explorer, who, on board the noted Polar sea vessel, the Windward, is bound for the Arctic seas on the Peary Relief Expedition.]

From Sydney, C. B., we shall sail straight to Etah, on the coast of Iceland. We suppose Mr. Peary is at Cape Sabine, on the opposite shore of the sound. The sound is about twenty-seven miles across, and should it be free of ice we ought to cross in a few hours, although the passage may require a week. If we reach the sound, cross, have no delay in meeting Mr. Peary and his party at Cape Sabine, and can return before the sound fills with ice, this fifth and last relief expedition will have been a success. A great many obstacles, however, may be met.

In the first place, we know nothing of Mr. Peary's whereabouts for a certainty. Should he not be at Cape Sabine and the natives have no information of him, then there will be nothing to do but wait until he comes. Might not that mean another winter in the north? I don't know. Naturally, we shall not come back without him. I should not care to put in another winter like that one I spent in waiting for him. I knew that time what it is to be desperately poor. I had not even cotton to mend Marie's dresses when they were torn. I had finally to put her in furs.

We have every hope, as we had when we started that time, that my husband will be waiting for us at Cape Sabine, but I confess all the circumstances of this expedition are not so promising as I would like. I am worried about the health of my husband and his party. No other polar expedition, I think, has been without a physician, and the return of Dr. Diedrich, whose mind became unsettled, and who left the party despite their protests, has, of course, increased the disadvantages under which they have worked. Lieut Peary will positively come back this time for good, whatever may be the outcome of the expedition. I am thinking in planning this expedition that it will be the last, and that makes it a pleasure.

Baron Shibusawa of Japan is reported to have come to America to negotiate a combination on the Pacific similar to the steamship trust that has been organized by Mr. Morgan.

COST OF LIVING IN MEXICO.

If native products are consumed the cost of living in Mexico is about the same in gold as in the United States; if imported products are used, the cost is from 50 to 100 per cent greater. An American family finds it extremely difficult to live here at all for the first year or two. The houses are built differently. The common form of a Mexican house is that of a square box, with the rooms built around an open court, without any method of arrangement or convenience. The walls are of stone and very thick, holding moisture a long time during the rainy season. This makes the rooms damp and chill and renders fire necessary on many days. There is no provision for heating and the Mexican raises his hands in horror at the suggestion of fire in a living room. Bathrooms are seldom found in Mexican houses, it being the custom to patronize the bathhouses.

Wood for fuel is very expensive, costing about 25 cents per arm load. Charcoal costs 50 cents per bushel, American money. Rents are extremely high. A six-room house or vivienda (flat) costs from $25 to $75 American money. A house that would rent in the United States, according to location and appearances, for $100 gold per month, commands $250 gold in Mexico. A desirable building lot in a choice location, 50 to 150 feet, costs from $10,000 to $15,000. In outlying sections and in the suburbs the cost will be about one-half of this.

Panorama of City of Mexico—The Palace.

PRESERVING MINE TIMBERS.

In experiments at the Altenburg colliery, near Saarbrucken, Germany, made with a view of ascertaining the best preservative of mine timbers from rot, lime, tar and carbolineum were used. Lime proved of least value. The wood coated with coal tar appeared to remain perfectly sound, but it was found that this only applied to the outer surfaces, the interior of the timbers having in every instance rotted completely. Carbolineum, on the other hand, gave very good results. Before coating timbers with material the wood should be barked and well dried.

ELECTRIC CURRENT FOR COLD FARMS.

An effort is being made to use electricity in agriculture. A seed field is covered by a network of wire, and a strong electric current is turned on during nights and chilly days, but cut off during sunny and warm weather. The system is invented by Professor Lemstrom, of Helsingfors, Finland. Nothing can be said as yet as to its practicability.

Any incandescent electric light will burn under water at any depth if the wires and the lamp are protected from getting wet.

Leon Foucalt installed a great pendulum in the Pantheon to demonstrate the motion of the earth. In 1832 it was removed by decree of Louis Bonaparte. Now it is being restored.

TUG OF WAR: HORSES VS. AUTO.

An interesting contest took place recently between a team of three horses, owned by Cole's Cartage Co., of 255 Michigan St., Chicago, and one of the buses owned by the Chicago Motor Vehicle Co., says the Motor Age. Mr. Keith, of the latter, had been talking with Mr. Cole relative to the use of automobiles and the latter had offered to back up his opinion that his three horses could do more work than the motor. The result was that the horses were hitched to the bus and on a given signal both they and the motor were started. There was a moment of uncertainty and then the bus pulled the horses backward. A second and third trial was made, the horses in each of these cases being allowed a good start so as to set the bus in motion backward before the power of the bus was applied. The operator of the bus had no difficulty in stopping the horses at will and pulling them backward.

DROUTH IN AUSTRALIA.

Australia is experiencing a terrible drouth. In many districts three-fourths of the sheep and cattle are dead, crops are burned up and great distress occasioned. Mines have shut down for want of water to make steam. The drouth has lasted several years, but is more terrible this year than ever before.

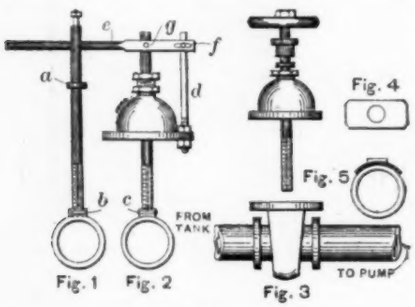
SHOP NOTES

A MADE OVER GATE VALVE

Mr. H. A. Greene, of Boston, describes in Railway Machinery how he made over some gate valves as follows:

I had four large gate valves, in three of which the threads of the screw had become stripped or worn out, while in the fourth the thread had become jammed in such a manner that the stem could not be screwed into or out of the disk. As it would have been an expensive job to take the valves out a quick repair job was made as follows:

The bonnet of each valve was unbolted and the bonnet, stem and disk removed. On the stem was a solid shoulder or collar,a, Fig. 1,which prevented the stem from rising or lowering when it was being used. This collar was sawed off with a hacksaw and the stem filed down smoothly. A hole was drilled at b through the disk and stem and a brass pin c put in to hold the two together. The stem was then put back



A MADE-OVER GATE VALVE.

through the bonnet without the hand wheel.

A piece of round iron d with two nuts on one end was put through one of the bolt holes in the flange of the bonnet and served for a lever post. A piece of ¾-inch pipe e, flattened at one end and slotted for the pins f and g answered for a lever and I thus had four good lever valves.

I also had an 8-inch gate valve in a suction pipe to an elevator pump. This valve could not be operated far enough to jam the disk, and when the pump was running it clattered and was very noisy, causing no end of trouble.

As there was no other valve between this and the tank and it was necessary to keep the tank full to supply other pumps, the removal of this valve was impossible. To remedy the trouble I first closed the valve tight, then taking out the stuffing-box gland I unscrewed the stem from the disk, leaving the disk in place of the valve body.

The bonnet screws were then taken out and bonnet, stem and all removed from the valve. A piece of double-thick leather, Fig. 4, having a hole large enough to pass over the hub on the disk was then placed on the back of the disk, as shown in Fig. 5. The stem, bonnet and stuffing-box were then replaced.

Now when the valve is opened the disk can be raised until it cushions on the leather and there is no noise whatever. Our illustration is from Power.

PRACTICAL HINTS ON FIRING.

An extremely practical article on firing, written by Wm. Kavanagh, appears in the July Power, from which the following is extracted: Different methods of firing are shown in the accompanying illustrations. Fig. 1 is a longitudinal view of a furnace showing the coal high at the center and falling away rapidly towards the furnace door and bridge wall. Fig. 2 is a cross-section of Fig. 1 and shows the coal high at the center and thin towards the furnace walls. This method of firing is known as the "humpback" and is very wasteful. Fig. 3 is an improvement over Fig. 1 and is known as the "wedge," with the large end nearest the furnace door. Fig. 4 is the reverse of Fig. 3, showing the wedge with its large end nearest the bridge wall.

There are many engineers and firemen who religiously believe in the wedge method, some preferring Fig. 3, others Fig. 4. Nevertheless, the wedge shows the least resistance to the air at its thinnest end, which admits of a large volume of cold air, first assisting to cool the boiler and surroundings at the thinnest end and then being heated to the proper temperature at the expense of the thickest portion of the fire. Fig. 5 is known as the "scoop method," which shows the coal high at the furnace walls and becoming gradually thin towards the center. This method is not an improvement over the wedge, but is an improvement over Fig. 1, providing its center is not too thin. Its bad point is, the center being thin admits large volumes of cold air, which lead directly to a loss of fuel. Fig. 6 shows the "pancake" method of firing, in which the fire is maintained at the same depth all over the entire grate surface. In this method of firing, the resistance offered to the atmosphere in flowing through the coal is almost equal; hence a greater uniformity of heated gases strikes the boiler and passes over the bridge wall, to be carried through the tubes and delivered to the chimney with the greatest amount of heat extracted by the heating surface. In some instructions printed for the use of firemen they are told to carry a light fire where the draft is poor and a heavy fire where the draft is good. The writer is of the opinion that these instructions were printed for plants where no dampers existed.

A very handy tool is shown in Fig. 7 for leveling off the fire. A piece of ½-inch pipe long enough to reach to the bridge wall with a ½-inch tee screwed on one end, to which is fitted two pieces of ½-inch pipe about 14 inches long or long enough to go across half the fire. By sliding this tool along on top of the fire we can keep it

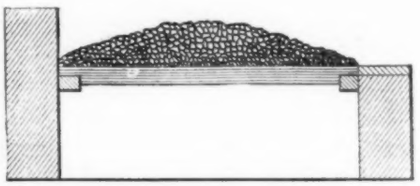


FIG. 1.

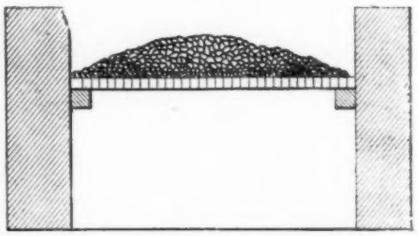


FIG. 2.

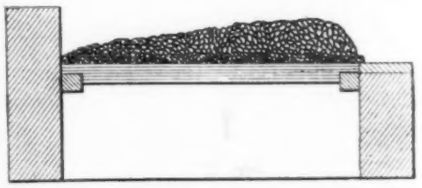


FIG. 3.

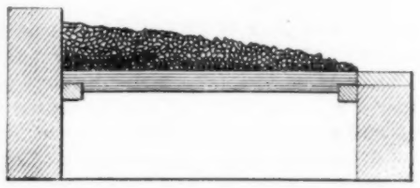


FIG. 4.

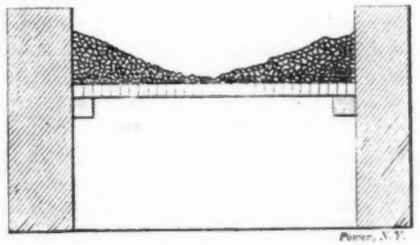


FIG. 5

very level and free from humps. Some firemen spread the bank with the rake. This is a very good tool to use in spreading the fire, as it affords an opportunity to pick out any clinkers or dirt during the operation. Fig. 8 shows a furnace fitted with a "dead plate" at the rear end of the grate bars, as shown; if we bank the fire as shown we can push back the bank on dead plate and haul out all ashes and clinkers

without danger of mixing them into the bank. This method is superior to banking at the bridge wall, as it enables us to

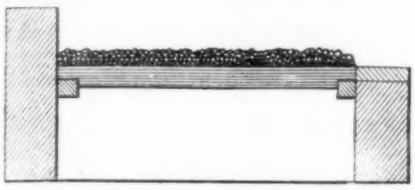


FIG. 6.

FIG. 7.

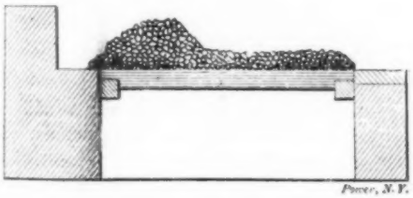


FIG. 8.

spread the fire immediately after hauling out the ashes, besides there is not so much coal lost in "jumping" over the bridge wall during the operation of coaling the bank.

CALIFORNIA REDWOOD HARD TO PAINT.

The California redwood makes a handsome piece of lumber, and is largely used in that state in car work. It contains a peculiar acid that acts like alkali and causes the painters all kinds of trouble. Thos. H. Cornish, of the Southern Pacific railway, San Francisco, discusses this peculiarity in the Railway Master Mechanic. A redwood car painted in the usual way will blister and peel off in a few hours exposure to the sun. Mr. Cornish now prepares the wood by a coat of raw linseed oil containing a pint of benzine to the gallon. Any oil remaining on the surface after two hours is wiped off. After five days put on the next coat.

The next coat of paint after the oil coat is prepared as follows: To 15 lbs. of flat lead color, add 15 lbs. of litharge mixed as follows: Use enough best coach japan to make the litharge about as thick as mush. It is then poured into the flat lead, the whole mass, well stirred, is then put into the paint mill and ground as fine as possible, then thinned down with turpentine to a proper consistency to work easy under the brush. Give the cars three coats of this mixture (one each day); the coatings form a hard barrier and resist the acid wonderfully.

The next in line is a coat of preparation color to receive the knifing; this color is made in the following manner: 15 lbs. of rough stuff ready mixed to 15 lbs. flat lead. This combined mixture run through the mill, fine, and thinned to a proper consistency. The car receives one coat of this paint, the reason for using this mixture, which makes a solid hard surface, serves a three-fold purpose. First, the puttying is done on this coating, making it easier to use the block pumice or sand paper, as the rough stuff being in the mixture keeps the stone from clogging up, and also the sand paper. Second, it makes a fine surface to knife upon; there being just enough grit in the color and hard also, the knifing works excellent and much better than if it were all flat lead. Third, it is a great help in using the stone and sand paper on the knifing, which is prepared as follows: 11 lbs. dry white lead, separate, 11 lbs. rough stuff, mixed to a stiff paste, then add the dry white lead to the rough stuff then add the following liquids: 1 pint japan, 1 pint rubbing varnish. Run the mixture through the mill; it will come out a thick paste; this mixture will be found to be an excellent knifing when used over the preparation color. It fills up all the brush marks, dries hard, cuts easy, does not clog the stone and forms a part of the hard, solid surface with the other coatings which have preceded it. The car, blocked down, is then ready for pullman or any color desired.

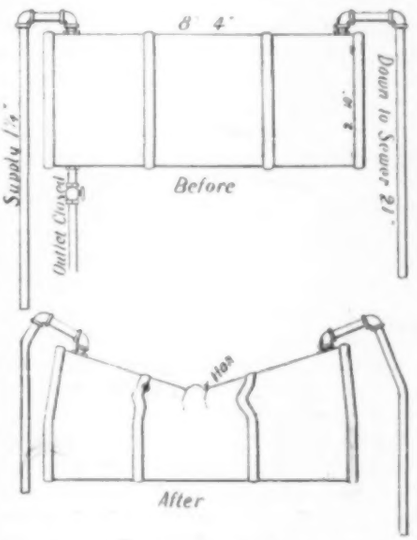
FIRING BOILER WITH SHAVINGS.

"Talent knows what to do; genius knows how to do it." A genius who had got no higher in the scale than the position of fireman found the way to get over one of the most disagreeable parts of his work, says the Wood Worker.

Firing a boiler with shavings by means of a shovel is by no means a cool task in the hot days of mid-summer, as this particular fireman found. To get over the worst part of the work, he made a bin on wheels, a little more than the width of the fire doors and long enough to hold a charge of shavings. The height of the floor of the bin was the level of the furnace doors. In firing, the bin was loaded at the shavings hole, then run to the open doors of the furnace and the shavings pushed in quickly with a scraper made for the purpose. This method of firing took less than a quarter of the time taken by the shovel method, and in addition to being quicker and cooler, had the added advantage of preventing the annoying gas explosions that had been frequent with a charge of fresh shavings on top of the fire.

CURIOUS FREAK OF SIPHON.

A laundry tank was made of No. 22 galvanized iron 8 feet 4 inches long by 2 feet 10 inches, all double seamed and reinforced with four raised hoops. The three pipe



flanges riveted on. All pipes were 1¼ inches iron. The supply pipe was attached to a steam pump, outlet to the washer and an overflow or telltale which made a straight drop of 21 feet to the sewer. The American Artisan tells what happened.

At the time of the accident the outlet was closed. The pump was run till the water was heard running down the overflow and then shut off. Still the water ran down this pipe, and the tank commenced sinking on the top and kept it up till the kink of the iron broke a small hole in the tank when air got in and broke the syphon, but not until the tank was practically ruined.

RAILROAD OPERATED BY WIND.

The Ferro Carril Tallal, one of the Chilean railways, has a gradual rise from the coast to the Andes, 80 miles distant. The motive power is obtained from the wind which constantly blows inland for 6 hours of the day. The cars, which are small and of very light weight, are equipped with sails by means of which they are blown by the wind to the upper end of the road. The return trip is made by folding the sails and coasting back by the force of gravitation.

TEMPERING WOOD SAWS WITH BRAZES.

A practical sawyer gives the following experience in the Wood Worker:

I have tried hot irons of different sizes and shapes, but the best results have been obtained from a gasoline torch, such as electricians use in soldering wires and painters sometimes use for burning off old paint. After I have dressed and tensioned the braze, I put it on the leveling block or near the middle of bench, and place a block of wood or piece of iron on each side of braze to raise it off the table say 1 or 2 inches. I then throw the torch flame from one edge of braze to the other, until it assumes a blue color, heating the saw blade evenly as possible.

When the braze is a nice blue color all over, I pull out the pieces that keep the saw up off bench and allow it to lie flat on leveling block. I then place a small anvil or block of iron directly on braze, and let it cool. I dress the braze on gage thinner than balance of saw blade. Such a braze will neither bend nor break.

If you have a few teeth in a saw that seem too hard, and crumble, place the saw in the filing clamp so that just the teeth show, then, holding a piece of asbestos board or charcoal on one side of these teeth, throw the gasoline torch flame against the points of teeth. You can in this way draw the temper to any desired degree. Do not take the asbestos or charcoal away too soon, but keep it there a few seconds after you have removed the blaze. This saves much heavy grinding to remove the hard points.

FLASH BOILERS DO NOT SCALE.

When flash boilers were first proposed for motor cars, the experts who had not tried them, said the scale deposited in such narrow tubes would choke them in no time. When the bolder spirits found they did not choke at all, the experts said the scale was blown off the inside wall of the tube by the rush of steam, or else cracked off it by the heat of the tube. My theory, says J. Brown, in the English Mechanic, is that scale never gets on. The experts were thinking simply that all boilers scaled, therefore this one would. They omitted to consider an essential difference. In ordinary boilers the water is in intimate contact with the iron; and the lime in solution, gradually depositing in crystalline form by evaporation of the solvent, fixes itself on the solid with which it is in contact. In the flash boiler the water is not in contact with the metal, but is separated from it by a layer of steam through which the heat passes to the water. Any solid deposited by evaporation is therefore isolated by this steam layer, and forms in small particles in the water. It has no chance to attach itself to the metal tube.

The following very pretty and simple experiment illustrates this: Put into a clean silver spoon a few drops of lime-water, and evaporate to dryness by boiling over a spirit-lamp. The lime is deposited on the silver in a rather tenacious coating. It may be cleaned instantly with a drop of dilute hydrochloric acid. After drying and polishing the spoon, place it over the lamp, and keep it hot while two or three drops of the lime-water are allowed to fall into it. The liquid immediately assumes what used to be called "the spheroidal state"—*i. e.*, it gathers up into a pretty bead, which, supported on its layer of steam, runs about the bright bowl of the spoon. At first it is limpid, but soon becomes turbid by deposit in it of the lime in small particles. The motion of these indicates violent internal emotion in the spheroid, and there is evidently evaporation, which rapidly reduces the size of the spheroid till the liquid having all gone, there remains only a little heap of loose particles not adhering at all to the metallic surface of the spoon, which has not even been dimmed in the process.

GERMAN METHOD OF MEASURING FABRICS.

German manufacturers of fabrics use a strip of paper with measurements printed to show number of yards in the roll. This strip is wound in the roll as fast as manufactured. A recent invention causes the measuring strip to change its position in being wound to avoid the damage which has been caused delicate satins and velvets from the strip having been wound in one spot all the way through the roll.

In China probably more wood is used for coffins than for any other purpose. The coffins are made of lumber from 4 to 10 inches thick. It is not a high estimate to say that from 8,000,000,000 to 10,000,000,000 feet of lumber are annually thus utilized.

COMPRESSED AIR CARS IN FLOOD.

In Rome, N. Y., the street cars are run with compressed air carried in strong steel tanks under the car. The Street Railway Review has an interesting account of the new system and illustrates the remarkable performance of one of these cars, which was able to run through streets where the water was nearly two feet deep. Trolley cars could not have been operated in such deep water. The illustration shows the compressed air car plowing through the flood and throwing the water high in air.

Car that Does Not Stop for Floods.

LONGEST TROLLEY LINE IN THE WORLD NOW BEING COMPLETED IN OHIO.

The longest trolley line in the world is being developed by the construction of new tracks which will connect present city and country lines in Ohio. When finished it will be 204 miles long and passengers can take a trolley ride in Toledo and get off at Cincinnati. Sleeping, dining and parlor cars will be provided and the traveler will have all the comforts of the steam roads without the smoke and cinders. To carry out the plan $5,000,000 is required.

WORSE THAN MURDER.

A sentence was once pronounced by a Scotch judge with the following accompaniment: "Ye did not only kill and murder the man and thereby take away his valuable life, but ye did push, thrust or impel the lethal weapon through the belly-band of his regimental trousers, which were the property of his Majesty."—Glasgow Evening Times.

Wire hoops are rapidly displacing the wooden hoops in the cooperage trade. Wire is cheaper and stronger.

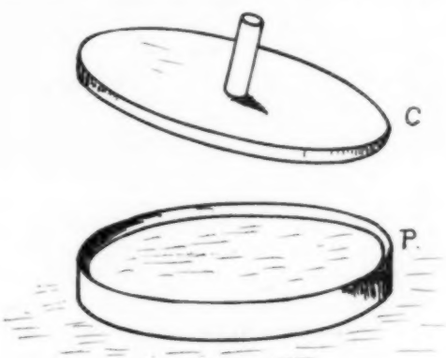
Easy Electrical Experiments FOR BOYS

By L. P. Dickinson

CHAP. XXIX.—HOW TO MAKE AN ELECTROPHORUS.

Experiments with static or "frictional" electricity are always interesting and instructive. Whenever a substance like sealing-wax or resin or hard rubber is rubbed with a piece of fur or flannel, the sealing wax, or whatever substance is used in place of the wax, is found to be electrified. This is shown by the fact that it will attract pieces of paper or light balls made of pith. The fur, or flannel, also becomes electrified, as everyone knows who is familiar with the effects produced by stroking a cat in the dark.

The instrument to be described in this paper depends upon



The Electrophorus.

effects produced in the manner just indicated. By means of it, sparks from a quarter to one-half an inch in length may be easily produced, and by means of a condenser, to be described later, quite brilliant effects may be obtained.

There will be needed, first of all, a large shallow tin dish. The cover to a tin pail will answer nicely. If possible, a cover at least 12 inches in diameter and 1 inch deep should be chosen.

In a large iron dish melt together a mixture composed of 2 parts resin and 1 part gum shellac. There should be enough of the melted mixture to nearly fill the tin cover when the mixture is poured into the cover. This cover, with the melted resin inside, is shown at P in the accompanying figure. If the resin cracks a little on cooling, or if subsequent use should cause cracks to occur, it can easily be re-melted and used again.

Next make a circular wooden disc, shown at C. It should be about ½ inch smaller in diameter than the inside of the tin cover. It is provided with a handle at the center as shown, the length of the handle being about 3 inches. The edges of the disc should be rounded off very smooth, and the whole surface sandpapered.

The entire disc is now to be covered with a smooth layer of tin foil. A quantity of this may easily be secured of any dealer in tobacco, as it is used in packing the latter. Paste enough pieces of the tin foil together so that two circular sheets of foil may be cut out, each one being one inch larger in diameter than the wooden disc. Glue one sheet to each side of the wooden disc (cutting a hole in the center of one for the handle to pass through) and smooth the foil nicely over the edges of the disc, so that the lower and upper layers of foil overlap smoothly, and are glued in place.

The disc thus made must be supported by some form of non-conducting handle. The easiest way to do this is to whittle down the wooden handle already provided, until it fits tightly into the neck of a moderate sized bottle. The latter is forced upon the wooden handle, and in using the apparatus, the disc must always be lifted by means of the glass handle thus formed.

To use the apparatus, proceed as follows: Procure a piece of pure wool flannel, and rub the rosin briskly with the flannel. The rosin should become electrified, and should be capable of attracting small bits of paper or cloth.

Now place the tin foil disc upon the rosin and touch the tin-foil with the tip of the finger. Then remove the finger, and lift the tin-foil disc by means of the glass handle. Holding it by the glass handle, present the knuckle of the other hand to the tin foil, slowly bringing it nearer and nearer to the disc. When about a quarter of an inch away from the disc, a spark will jump from the disc to the hand, and if the room be dark this spark can be plainly seen.

It is necessary to hold the disc by its glass handle, and the operator must not neglect to touch the disc in the manner described before lifting it from the rosin.

The sparks thus obtained are quite small, especially in warm damp weather. In our next paper we shall describe a condenser for storing up a large number of charges, producing much more powerful effects.

HUMAN INCUBATOR HATCHES CHICKENS.

Fever Patient Utilized By His Wife to a Resourceful Purpose.

John Filson, a farmer, living near Eminence, Ky., furnishes the only instance of a human incubator on record. He is the proud father of 44 little chickens, but the remarkable success of his hatch is largely due to the practical bent of his wife's mind. For months Filson had been ill with fever. His temperature rose so high that it heated all the bed clothing. He was the sole support of the family. The larder was fast getting empty and the family was reduced to desperate straits. But Mrs. Filson always was a woman of resourceful ideas. The heated bedclothing under her fever-stricken husband suggested to her a method of relieving their distress. She borrowed four dozen eggs from a neighbor, fixed them in the bed so that they would not be crushed by the patient's movements and awaited results. The scheme was a crowning success. Only four of the chickens failed to hatch. Father and chickens are crowing over their success and Filson's fever has begun to subside.

GASOLINE BOATS IN BANANA TRADE.

Eight years ago two gasoline boats were introduced into the banana trade at Bocas del Toro, United States of Colombia, and they proved so successful that fifty of the boats are now employed in towing banana lighters to central points where the fruit is transferred to ocean steamships. The town of Bocas del Toro is surrounded by bays and lagoons which are lined with banana plantations. No fresh water is available except that which is caught from the roofs of the houses. The salt water is ruinous to steam boilers and a launch can be operated but a short time before being tied up for repairs. An enterprising planter has secured an expert from one of the American factories and installed a complete repair shop especially adapted to gasoline engines. The Engineering Magazine says:

"These tugboats are employed going from plantation to plantation gathering up the fruit, which, on account of its perishable nature, must be transferred in the shortest possible time to the ships. There are at present thirty-five of one make of gasoline engine in use in this district. The gasoline is shipped to the tug owners in 210-gallon drums, and the small space occupied in transport is especially in its favor as a fuel since there is no coal obtainable in the market and all of it must be shipped from the United States."

The farmers of Kansas propose to organize a milling and grain shipping industry with a view of eliminating the middleman.

Summer Course in Easy Mechanics For Boys.

By Wilbert S. Drew.

[This series, commenced in issue of June 28, will continue each week. It will give instructions which any boy can understand, how to use carpenter's tools and make things. In doing this only a few tools will be required, and cost of material will be small. The articles to be made will include a boat, table and similar subjects.]

BUILDING A PIGEON HOUSE.

The frame, indicated in the drawing by dotted lines, should be made first and put together securely with 10-penny nails. The sill is in four pieces, s, and s', and like the other parts of the frame, is made of 2x4 pine or hemlock, the latter being much the less expensive. The two pieces s s are each 2 feet 2 inches in length and the pieces s' s' are each 2 feet 10 inches long, and placed as shown. The four corner posts, c, c, are each 2 feet 10 inches long and should be placed just at the corners of the sill and nailed in position. On top of these, at the front and back of the house are nailed the two girts G, each 2 feet 10 inches long and on top of these again are placed the 2 pieces P, P, forming the plate, each of the same length as the girts. Now get out the 4 rafters, each 1 foot 11 inches long, being very careful to make the cuts square with the side of the piece.

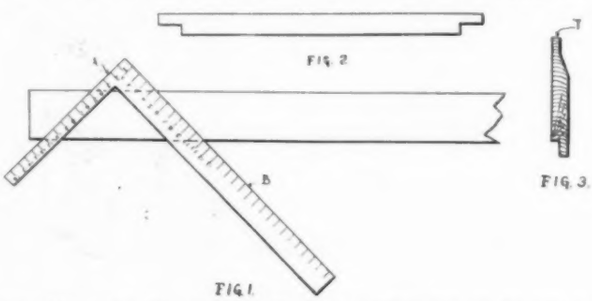


FIG. 1.

FIG. 2.

FIG. 3.

To lay out the ends of the rafters to the correct angle, place the carpenter's square in the position shown in Fig. 1, on the wide side of the piece and hold it so that any two corresponding marks as 8-8, 4-4, 11-11, shall just touch the lower edge of the piece and then draw a line along the edge A. From the outer end of this line measure off the required length, move the square to the point located, hold in the same position as before and draw a line along the edge B.

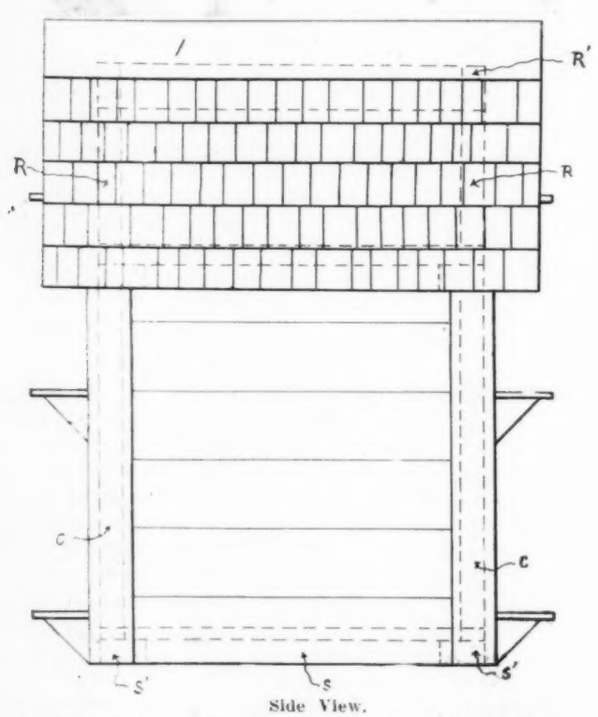
Having cut the rafters, put them in position, nail firmly to the plate and then put in and nail the ridge-pole R'. This will be 2 feet 10 inches long and placed as shown in the drawing.

This completes the frame and the next step is to lay the floor, using 1-inch matched boards, cut 2 feet 10 inches long and nailing them to the sill with 8-penny nails. The two outer boards must be notched as shown in Fig. 2, to pass by the corner posts.

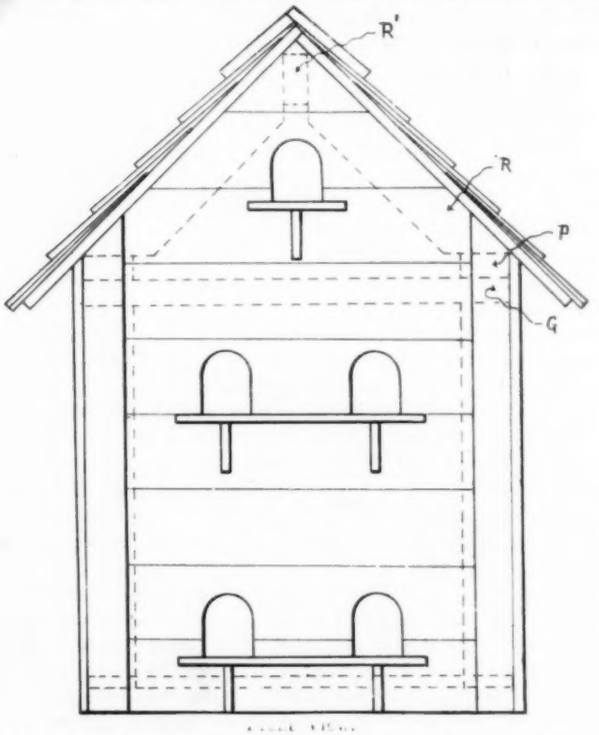
The boarding of the ends should next be done, using ordinary weather boarding, an end view of which is shown in Fig. 3. Begin putting the boards on at the bottom with the edge T upward. The lower edge of each board fits over the upper edge of the board below it, making a tight joint. Saw off the boards so that they just come to the outside edges of the corner posts and when the roof is reached, saw them to the outer edges of the rafters. Nail each end of the boards with two 8-penny nails into the corner posts and nail the upper boards into the rafters. We next proceed in the same way with the sides, bevelling off the top board where it fits under the roof.

We next put on the roof boards, for which common inch boards will do, running them up and down the slope of the roof. They are to be cut 2 feet 6 inches long and should be 8 inches wide, the end boards projecting 4 inches beyond the end of the house. Nail each board into the ridge-pole and into the plate, with three nails at each end. No effort need be made to make tight joints between the roof boards, as our roof is going to be shingled.

For the shingling we shall need a bunch of good shingles and some shingle nails. Begin by laying a double row of shingles at the lower edge of the roof, the upper row covering the joints between those of the first row, and making the lower ends



Side View.



of the shingles project an inch beyond the lower ends of the roof boards. The nails should be driven at least 6 inches above the butt or thick end of the shingle so that it will not be exposed to the weather. Having completed this double course at the lower edge of the roof, measure off 5 inches from the butt of each end shingle and make a pencil mark at this point, then nail on a straight strip of board with one nail near each end, so that its upper edge just touches the marks, but do not drive the nail more than three-quarters of its length, as this board has to be taken off after laying each course. Now lay the second course of shingles, a single one this time, placing the butts against the straight edge and breaking joints and nailing as before. Proceed in this manner until four courses beside the double one have been laid and then saw off the ends of the shingles that project beyond the peak of the roof. Now shingle the other side and then put on the two ridge boards, seen at the top in the drawing. These are to be 8 and 7 inches wide respectively and the joint at the top should be a good fit.

The windows may now be laid out as shown, 4 inches wide and 5 inches high and sawed out with a keyhole saw after boring a hole in which to start it. The drawing shows windows in each end; but if the builder so wishes these may be omitted from one end and a door 18 inches square substituted, so that access can be had to the interior. The door may be hung by a pair of tee hinges and secured by a padlock or button.

Two corner boards, 4 inches wide, should be nailed on each corner as shown and shelves 5 inches wide, supported by brackets, are placed under each window for the birds to alight upon.

The interior may be divided into compartments or not as suits the fancy of the builder.

The house may be placed upon a stout pole or secured to the roof of a barn or other building.

The house should be painted to match its surroundings, but do not paint the shingles. They will last much longer if left unpainted unless each shingle is dipped in paint before being applied to the roof.

Next week we will take up the making of a box to contain shoes, etc.

A well-known judge on a Virginia circuit was recently reminded very forcibly of his approaching baldness by one of his rural acquaintances. "Jedge," drawled the farmer, "it won't be very long 'fo' you'll hev to tie a string around yer head to tell how fer up to wash yer face."—Harper's Magazine.

Some men are born great, some acquire greatness, and others are just dubs.—Baltimore Sun.

Hauling Lumber in California

Our illustration shows a 60-horse power traction engine hauling 50,000 feet of lumber on six wagons in the lumber region near Mt. Shasta, Cal.

The wagons for use in hauling lumber are built specially for the purpose and have low wheels which are capable of running beneath a pile of lumber. The frame of the wagons has two cross pieces which support channel irons on the top side. The lumber is loaded on two skids and rigidly secured thereto. The skids are adapted to be hauled into the channel irons on the cross timbers of the wagons in loading and unloading. The lumber is loaded on the skids and after having been lashed, the engine is put into position, and by means of a cable, draws the whole load on to the wagon at one time. This train load of lumber was unloaded and the engine supplied with water and fuel ready for the return trip in 55 minutes.

60-H. P. Engine Hauling 50,000 Feet of Lumber.

These engines are a product of the west, being built on a line distinctly their own. They are of the three-wheel type, having the greater part of the weight supported on the two main wheels The freighting engines have main wheels 7 feet 6 inches in diameter and tires 24 inches in width. The front wheel is hung in a circle which is hung in another circle and guided by friction rollers. This may be operated either by hydraulic or hand power.

The main wheels are suspended independently of each other in large locomotive style oil reservoir boxes, which are supported by large helical springs. Each main wheel is driven independently by means of chains and sprockets, through the medium of a friction on each flywheel. When this friction is set, the wheels move simultaneously and at the same speed. In turning, one friction is released, allowing the outside wheel to be propelled while the other main wheel is allowed to adapt itself to the curve indicated by the guidance of the front wheel. This type of traction engine is built by the Holt Manufacturing Co., of Stockton, Cal.

The engine is located on the top of the boiler in plain sight of the engineer at all times. These engines are fitted to burn either coal, wood or oil. In the lumber regions they are used for logging purposes and are capable of ascending and descending grades up to 10 per cent with a full load, and steeper grades with proportionately smaller loads. They are capable of cutting through a forest where the large trees are wide enough apart to allow them to pass, making their own road as they go.

ALL ENGLAND CAN NOW TELEPHONE ALL FRANCE.

Heretofore the telephone cables connecting London and Paris have been used exclusively for stock exchange reports and press dispatches. Now the service will be extended to include comercial and other conversations. Eight shillings are charged for three minutes' talk.

LIBERTY SHINES AGAIN.

The famous Statue of Liberty at the mouth of New York harbor now shines brighter than ever, after having been in darkness 55 days. The oil burning lights have been removed and replaced with six electric arc lights which can be seen a great distance. The care of the statue is now in charge of the Lighthouse Board of the War Department.

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Books on Patents, and references will be furnished upon request

Respectfully,
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Telephone, Cent. 520.

CARNEGIE ARMOR PLATE FAILS IN TEST.

For the second time the Carnegie armor plate made for the new Battleship Missouri has failed to pass the government test at the Indian Head proving grounds.

Six-inch plate, representing a group of casemate armor, was substituted for the one which failed to pass the test a short time ago. This second failure, according to the specifications, rejects the group. It is understood, however, that at the option of the navy department, still another substitute plate can be submitted for test and should it pass, the acceptance of the entire group is a matter for the navy department to decide. The four-inch Bethlehem plate, representing a side armor for the protected cruisers, which was tried at Indian Head at about the same time, passed a satisfactory test.

AIRSHIP INVENTOR GOES FREE.

Herman Ganswindt, the German airship inventor, who was arrested on the charge of deception and forgery and gulling the public into subscribing for shares in an aeroplane company, has been given his freedom. Experts selected by the court to examine the model of Herr Ganswindt's airship, decided that the inventor was probably acting in good faith and that there is sufficient merit in his contrivance to disprove the charge of conscious swindling.

SIXTY-MILE AUTOMOBILE DELIVERY ROUTE.

A 60-mile automobile delivery route has been in operation in Worcester, Mass., since last April and has proved both rapid and economical. Newspaper deliveries are made at Leominster, Old Boylston, South Fitchburg, Fitchburg, and West Fitchburg. The automobile makes the round trip of 60 miles in time for the operator, Asa Goddard, to reach his home in Worcester for breakfast at 7:45 a. m.

The Automobile and Motor Review says: "On the run the little 4½-h. p. motor consumes only two of the four gallons of gasoline contained in the tank, at a cost of 30 cents, with possibly 5 cents more for lubricating oil."

If you see a fellow down,
Kick him:
If he has no friends in town,
Kick him:
When you see him, look askance:
If he struggles to advance,
And fails, trying, there's your chance
Kick him:
If he ever has done wrong,
Kick him:
If he tries to move along,
Kick him:
Though his punishment has been
Ten times greater than his sin,
Hell's his portion—shove him in—
Kick him.

—The Public.

CANADIAN MACHINE FOR LAYING BRICK.

Commercial Agent F. S. S. Johnson, of Stanbridge, June 23, 1902, reports a recent invention, which consists of bricklaying by machinery instead of by hand. He says:

The machine, worked by two men and a lad, will lay 400 to 600 bricks per hour. Door and window spaces cause only a slight delay. The machine is suited for all plain work, such as walls, sheds, mills, factories, rows of cottages, piers of bridges, etc. Considerable pressure is put on the bricks, and it is claimed that the work is more firmly done than by hand. The invention will do the work of six or seven skilled bricklayers, and it is believed that a machine adapted to build a factory covering about 60 by 40 feet could be put on the market for $500. The apparatus can be readily worked after a fortnight's instruction.

CUBA RAISES PATENT CHARGES

Cuba has raised the charges on American patents and labels so that an American will now have to pay as much as a person of any other foreign nation for registering his patents or labels in that country. The new regulation requires that such registration shall be made in the office of the Cuban minister of agriculture, commerce and industry and that the fee shall be $35 on American patents and $12.50 on American trade marks, labels, etc. These are the same exactions that Cuba makes of all other countries. The fee for such American documents under the military government was one peso each.

DISASTER IN SILVER MINES.

The explosion of the two powder magazines in the 1,200 foot level of the Daly-West mine at Park City, Utah, adds another to the long list of mine horrors that have been so destructive of life and property during the present calamitous year. Gases filling the Daly-West mine spread into the 600-foot level of the Ontario mine killing 36 men in the two shafts and overcoming the majority of the 250 men at work. Two rescuers asphyxiated in a desperate effort to save their comrades died after being lifted from the shaft. The Daly-West and the Ontario were two of the largest silver mines in Utah.

BIG DROP IN MINING PROFITS.

The annual reports just made by the mining companies of the Butte, Mont., district to the tax assessors, show a decrease of more than $10,000,000 in the net earnings of the mines during the year ending June 6, as compared with preceding year. The total earnings for 1901 were $15,749,735 and for the year past they were but $5,544,632.

THE DREAD OF THE TOILER.

When I am very old,
With withered face and trembling, palsied hand,
The hour-glass of life, to feebly hold,
And watch the slowly disappearing sand;
Whose gentle hand will brush away the tear?
What loving heart will always linger near?
When I am old?

When I am very old
And poor, as all who toil must be,
My faltering footsteps then no longer bold,
To tread upon a world's adversity.
Whose youthful hand will give me daily bread?
Or lend a pillow for my aged head,
When I am old.

When I am very old,
The mile-stones of my life so nearly passed.
And sorrow's gloomy pages doth unfold,
To memories dreary wanderings at the last;
Who, then, will wear the toilers heavy crown,
Or take my burden where I lay it down,
When I am old?

When I am very old,
A wanderer on the highway of distress,
To know the blasts of winter's icy cold,
Or sigh in lonely spirit of unrest;
Whose voice will speak the kindly word that cheers?
I lived a day, and died through fifty years,
And now I'm old.

Ah, yes, my friend, when you and I are old,
And on our brow death's icy hand is laid,
Redeeming then, the pledges often told,
That nature claims each life that she has made;
Who then, will weep around our silent bier,
Or weave the halo of a suddened tear.
When we are old?

—Harry Smith in Railroad Trademen's Journal.

FINDS ZINC MINE IN ILLINOIS.

A rich zinc lead is said to have been discovered on a farm near Shelterville, Ill., on the line between Pope and Hardin counties. C. A. Gordon, a traveling man, who a few years ago bought 40 acres of land in Pope county, which was at that time considered worthless, has resigned his position and will engage in mining zinc ore. Gordon has refused $1,000 an acre for his land.

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